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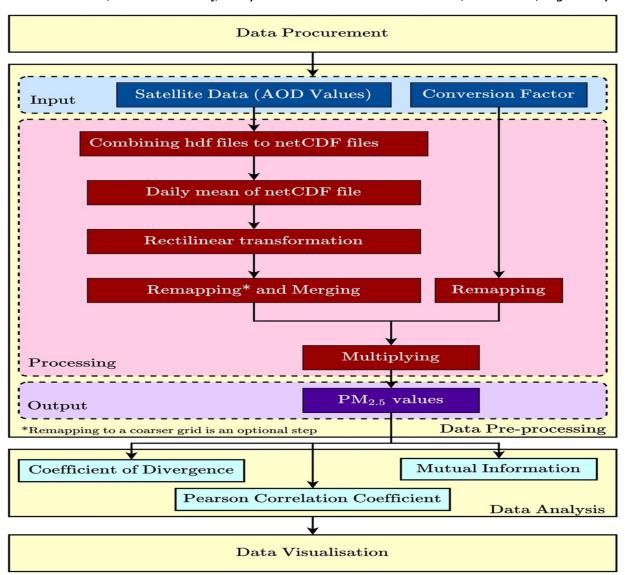
CarbOnaceous AerosoL Emissions, Source apportionment & ClimatE impacts
Understanding scientific complexities related to carbonaceous
aerosols focussing on issues underlying their origin and fate, and
their role as drivers of regional climate change over India.





Identifying regionally representative sites using satellite data - Methodology

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Key highlights:

- Discusses the processing of satellite data used in site-selection methodology discussed in Lekinwala et. al., (2020).
- High-resolution AOD data obtained from NASA's Aqua and Terra satellite using MA-IAC algorithm is used.
- AOD data is converted to PM2.5 using GE-OS-Chem Chemical Transport Model.
- Tools like CDO, NCL and in-house Python codes are used for processing.

Statistical metrics like Pearson Correlation Coefficient, Coefficient of Divergence and Mutual Information are used to quantify and extract useful information from it.

Summary:

The focus of the work is satellite databased analysis for the identification of regionally representative sites using a weight-of-evidence approach. The different steps involved for the same



are discussed in detail for processing the satellite data using NCL and CDO, computing different metrics used along with a Python code for the same. Along with the metrics like the Coefficient of Divergence (CoD) and Pearson Correlation Coefficient (PCC) used in literature, this work also proposes the use of Mutual information (MI) as a metric to capture the nonlinear relationship in the data. To facilitate better interpretation and comparison, all the above methods are visualised on a spatial map.

Data Procurement Satellite Data (AOD Values) Conversion Factor Input Combining hdf files to netCDF files Daily mean of netCDF file Rectilinear transformation Remapping* and Merging Remapping Multiplying Processing $PM_{2.5}$ values Output Data Pre-processing *Remapping to a coarser grid is an optional step **Mutual Information** Coefficient of Divergence Pearson Correlation Coefficient Data Analysis Data Visualisation

Figure 1:CoD, PCC and MI metrics showing regional representativeness of a potential site at Bhopal.

Major findings:

- Development of an approach for analysing satellite data for site identification application.
- Proposing the use of Mutual Information as an additional metric along with the Coefficient of Divergence and Pearson Correlation Coefficient.

Research Article

Citation

Lekinwala, N. L., Bharadwaj, A., Raman, R. S., Bhushan, M., Bali, K., & Dey, S. (2020). Weight-of-evidence approach to identify regionally representative sites for air-quality monitoring network: Satellite data-based analysis. MethodsX, 7, 100949.

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